The EASI Demand System : Evidence from China Household

Ze Song and Lianyou Li and Chao Ma

School of Finance and Statistics, Hunan University, School of Government, Nanjing University

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by

Ze Song
School of Finance and Statistics, Hunan University, Changsha, China

Lianyou Li
School of Finance and Statistics, Hunan University, Changsha, China

and

Chao Ma
School of Government, Nanjing University, Nanjing, China

Mailing Address: Ze Song
SFC, Hunan University
Shijiachong Road 109
Yuelu District, Changsha,
China

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E-Mail Address:benz1985@163.com

Abstract

We have applied the Exact Affine Stone Index(EASI) implicit Marshallian demand system, invented by Lewbel and Pendakur (2009), and iterate three stage least squares to analyse Chinese household consumer demand in urban area. Our results show a demand system rank to equal five which supports the conclusion of Lewbel and Pendakur (2009), and the applicability of the model with or without interaction terms. Heterogeneity demographic characteristics and price affect Chinese household consumer demand system in urban area. From 1995 to 2007, ratios of food and transportation-communication in total expenditure decrease ,and other expenditure ratios increase.

Keywords: Engel curves, The EASI Demand System, Chinese Household

JEL Classification: D11, D12

1. Introduction

Since 1978, economic reforms in China have significantly increased household income and improved the standard of living. As a result, the per capita disposable income of urban household and rural household are 19,109 yuan and 5,919 yuan in 2010, which are nine times more than those is 1978 separately. As their incomes increase, Chinese household are changing the pattern of consumption in way. Firstly, household pay more attention to various consumption, such as clothing, home maintenance, recreation and transportation etc, not just food. Secondly, differing income responses for quantity and quality demanded of different consumption mean that Engel curves of household has changed as their incomes increase.

Based on empirical studies, Deaton and Muellbauer (1980) model the Almost Ideal Demand System(AIDS), which satisfied the axioms of choice exactly, and aggregated perfectly over consumer without invoking parallel linear Engel curves. The contribution of Deaton and Muellbauer (1980) and Jorgenson et al. (1982), should be making the integration of the Working-Leser Engel curse and integrable consumer theory. And then,Gorman (1981) first investigates the shape of Engel curves and consistency with consumer theory detailedly. In order to improve the models of consumer demand, researchers focus on unobserved preference heterogeneity and model error terms(Brown and Walker (1989); Mcfadden and Richter (1990); Brown and Matzkin (1998)). Lewbel (2001) justifies the connection that between the rationality of individual demand functions **d** and the rationality of statistical demand functions **D**. Blundell et al. (2003) reveal preference theory to consumer demand; Blundell et al. (2007) develops the IV approach to estimation under endogeneity for semi-nonparametric Sharp-Invariant Engel curves. To Address issues above, Lewbel and Pendakur (2009) introduce the Stone log price index Stone (1954) to model the Exact Affine Stone Index(EASI) class of cost function. In contrast to the AIDS system, the EASI demand system also allows for flexible interactions between prices and expenditures, permits almost any functional form for Engel curves, and allows error terms in the model to correspond to unobserved preference heterogeneity random utility parameters. Lewbwl (2010) characterizes the set of all regular preferences and associated demand functions that give rise to shape-invariant Engel curves.

Due to the development of the theory, there are a series of empirical Engel curve studies using different estimation methods for many commodities and country-specific data, such as estimation using nonparametric(Bierens and Pott-Buter (1991); Hardle and Jerison (1991); Hausman et al. (1995); Banks et al. (1997); Blundell et al. (2003))and semiparametric(Brown and Matzkin (1998); Blundell et al. (2007)). The country-specific data are British Family Expenditure Survey(Deaton and Muellbauer (1980); Lewbel (1991); Blundellet al. (1993); Lewbel (1996); Brown and Matzkin (1998); Blundell et al. (2003); Lewbel (2003); Blundell et al. (2007)), America Consumer Expenditure Survey(Lewbel (1991); Hausman et al. (1995)), Canadian Family Expenditure Survey(Lewbel and Pendakur (2009))and Budget Survey for the Netherlands(Hardle and Jerison (1991)).

As to China, empirical Engel curve research just showed the Food demand, rather than other commodities. Wan (1996) demonstrates the superiority of the proposed model against the conventional approach utilizing an unexploited set of data from China. Gao et al. (1996) use rural household microdate from Jiangsu province of China to evaluate economic and demographic effects on Chinese rural household demand. The results indicated that the slow growth of food consumption in China during the latter half of the 1980s was a result of income stagnation rather than consumption saturation.Huang and Gale (2009) used Chinese household survey data for urban households (China NBS, 2002-2005)to apply a unique approach to measure income, quality, and nutrient elasticities within the same framework of Engel relationship. They find out that the income elasticities diminish as income rises.

In this paper, we employ the Exact Affine Stone Index class of cost function(Lewbel and Pendakur (2009))to estimate Chinese consumer demands that address the issues above while maintaining the simplicity of the AIDS model. Lewbel and Pendakur (2009) think that EASI implicit Marshallian demand functions have several properties We use Chinese Household Income Project Series(1995, 2002) and the survey on Rural-Urban Migration in China (RUMiC, 2008) micro-data to analyse the Chinese case. Our results show a demand system rank to equal five support the conclusion of Lewbel and Pendakur (2009), the relationship with sample distribution and EASI implicit Marshallian demand functions with or without interaction terms such as py, zj, and pz'. Heterogeneity demographic characteristics and price effect Chinese household consumer demand system in urban area.the ratio of food and transportation-communication in total expenditure decrease ,and other expenditure ratio increase during 12 years.

The layout of the paper is as follows. Section two contains data and our assessment of the Engel curve relationship. In section three, the methods, models and test are presented. Section four presents the Empirical Results of our estimation. Section five is the conclusion.

2. Data and the Shape of the Engel Curve Relationship

We study Engel Curve and Demand System with three datasets:the 1995 and 2002 waves of Chinese Household Income Project Series (CHIPS),and the 2008 wave of a survey on Rural-Urban Migration in China (RUMiC).These were used to measure and estimate the distribution of personal income and related economic factors in both rural and urban areas of the People's Republic of China. CHIP survey is conducted by the Institute of Economics, Chinese Academy of Social Sciences, with assistance from the Asian Development Bank and the Ford Foundation. It has advantages over other data sources in that the samples were chosen from significantly larger samples drawn by the National Bureau of Statistics of China (NBSC). The survey also covers a large scale of variables to reflect socioeconomic variables, demographic characteristics, migration history,and the family situation before leaving the home village.RUMiC 2008 is used to replace CHIP 2007 to analyse Engel Curve and Demand System (CHIP 2007 is only part publicly available). The 2008 wave of RUMiC is a large-scale household survey conducted in China. It is initiated by a group of researchers at the Australian National University, the University of Queensland and the Beijing Normal University with support by the Institute for the Study of Labour (IZA)(Cui et al. (2013)). The household data used in this paper come from an urban household survey of CHIPS(1995, 2002)and RUMiC(2008),and a rural to urban migrant survey of CHIPS(2002) and RUMiC(2008). the CHIP 1995, 2002 and RUMiC 2008 data are sampled from different receiving provinces.the CHIP 1995 data is sampled from eleven provinces, namely:Beijing ,Shanxi ,Liaoning ,Jiangsu ,Anhui ,Henan , Hubei , Guangdong , Sichuan , Yunnan ,Gansu. the CHIP 2002 data is sampled from one more province than the CHIP 1995 data, namely:Chongqin. The RUMiC 2008 data is sampled from nine provinces, namely:Shanghai, Jiangsu, Zhejiang, Anhui, Hubei, Guangdong, Chongqin, Sichuang. Based on Provinces information, Price data is from Annual of China Nation Bureau Statistic (1996, 2003, 2008). we use the consumer price index to construct the price IV .These data contain the consumer price index in expenditure categories: food, clothing , transportation-communication, dwelling , education-recreation ,household furnishing, medical care , yielding seven expenditure share equations to be estimated. Prices are normalized that price vector facing national prices index in 2002(1, 1,..., 1). Our sample for estimation consists of 17880 observations of household that has nonnegative expenditure for food, clothing , transportation-communication, dwelling , education-recreation ,household furnishing and equipment, medical care. We only keep the information of householder who's age is between 20 to 60 living in the city in our sample. We add observable demographic characteristics in our model: (1) the gender of householder; (2) the age dummy of householder equal to one if the age of householder is more than 39 ;(3) the education dummy equal to one if the education level of householder is equal or higher than senior school; (4)the marriage status dummy equal to one if householder is single now; (5)the number of minor child ; (6) the number of adult; (7) the migrate dummy equal to one if sample is from the rural to urban migrant survey; (8)the year dummy equal to one if the sample is collected in 2002, equal to two if the sample is collected in 2007. Table one gives summary statistics for our estimation sample.

As same as Banks et al. (1997),we begin our analysis by providing a nonparametric description of the Working-Leser model. In our analysis, each expenditure share is defined over the logarithm of total expenditure. To preserve homogeneity of composition, we only use double adult and one minor child urban households, and the householder aged 40 to 60(2511 observations). Figure 1 presents nonparametric kernel regression, local quadratic polynomial regressions ,and pointwise confidence intervals for the nonparametric Engel cures of our seven commodity groups in the middle of our sample. In all kernel regressions we use the Gaussian kernel. Our results support the conclusion of Banks(1997) food share curve, and other share curve must be nonlinear.

3. Models and Method

In order to solve the linear problem of Engle Curve, we employ substituting implicit utility into the Hicksian budget shares yields the implicit Marshallian budget shares(Lewble and Pendakur,2009):

$$w = \sum_{r=0}^{5} b_r y^r + Cz + Dzy + \sum_{I=0}^{L} z_I A_I p + Bpy + \varepsilon \tag{1}$$

where y is measure of real total expenditures,The regressors in this model are a fifth-order polynomial in y, log-price p of each good,and L different demographic characteristics z. (1) is the matrix form of the equation provided in the introduction. Consider approximating our real expenditures measure y with nominal expenditures deflates by a Stone price index : that is , replace y with $\tilde{y}$ defined by

$$\tilde{y} = x - p^{'}\bar{w} \tag{2}$$

For some set of budget shares $\bar{w}$,x is nominal expenditures. Then, by comparison with equation(2), we have

$$w = \sum_{r=0}^{5} b_r \tilde{y}^r + Cz + Dz\tilde{y} + \sum_{I=0}^{L} z_I A_I p + Bp\tilde{y} + \tilde{\varepsilon} \tag{3}$$

where $\tilde{\varepsilon}$=ε with $\tilde{\varepsilon}$ defined to make equation (3). The model of equation (3) is the Approximate EASI model.The exact EASI model (without approximation) in Lewbel and Pendakur (2009) is

$$\begin{aligned} w = {} & \textstyle\sum_{r=0}^{5} b_r (\frac{x - p^{'}w + \sum_{I=0}^{L} z_I p^{'} A_I P/2}{1 - p^{'}Bp/2})^r + Cz + \sum_{I=0}^{L} z_I A_I p \\ & + (Dp + Bp)(\frac{x - p^{'}w + \sum_{I=0}^{L} z_I p^{'} A_I P/2}{1 - p^{'}Bp/2}) + \varepsilon \end{aligned} \tag{4}$$

compensated budget-share semi-elasticities with respect to prices are given by the matrix is

$$\Upsilon \equiv \sum^{l=0} {}^{L} A_l z_l + By \tag{5}$$

Compensated (good-specific) expenditure elasticities with respect to prices are closely related and are given by

$$\Gamma = W^{-1}(\Psi + ww^{'}), whereW = diag(w) \tag{6}$$

The normalized1 Slutsky matrix, S, is related to the compensated semi-elasticity matrix,Υby

$$S = \Upsilon + ww^{'} - W \tag{7}$$

To deal with possible measurement error or endogeneity, we use iterative three-stage least squares method combined with instrumental variable to modify readily. This method is recommended by Lewbel and Pendakur (2009), whose semi-parametric iterative estimation procedure is based on Dominitz and Sherman (2005). Therefore, we set 0.000001 for the dimension of the iterative convergence.

4. Empirical Results

Since our sample is large (7 equations times 17880 observations per equation),in order to test various hypotheses of the model, we use the Wald-tests and a 1 percent critical value for all tests. Turning to expenditure effects, we first check for adequacy of our six-order and minus the first order polynomial in y by adding y^6 term and y^{-1} term to the model. Iterative estimation procedure can't be convergent. Then ,we only keep six-order polynomial in y by adding y^6 term to the model, iterative estimation procedure still can't be convergent. There lack of evidences to support to asymmetric with y^6 term and y^{-1} term, so we present further results for a symmetry-restricted model with r=0,1...,5 as (Lewbel and Pendakur (2009)).

Considering price effects, the Wald test of symmetric without y^6 term and y^{-1} term is not rejected or either the level of prices ($A_l = A_l'$ for all l)or for prices interacted with implicit utility y ($B_l = B_l'$).Turning to evidence of complicate Engel curve shapes, we test for whether each of the six budget shares equation can be reduced to a quadratic. The tests suggest that five budget shares equation are statistically significantly nonquadratic: food, cloth, transportation-communi. The results support our methodology that the order polynomial in y is five.(see Table two)

To consider demographic characteristic, the wald test doesn't reject gender, age, education, marital, child, adult, migrate and year varible.(see Table three)The table four presents the symmetry-restricted parameter estimates for the exact EASI model . The R-sq values for the six equation are 0.200, 0.609, 0.386, 0.286, 0.041, 0.087. the y^4 and y^5 are statistically significantly for transportation-communication and dwelling shares equation in 5% significance level , so There are some evidences to support conclusion of what rank of typical parametric demand model is not limited to three in Chinese data.

Price effects are most easily evaluated by looking at compensated budget share semi-elasticities, compensated (good-specific) expenditure elasticities, or compensated quantity derivatives (aka, Slutsky terms). Considering, first, the matrix of compensated budget-share semi-elasticities for the reference household:a married male householder under the age of 40 with senior high school educational level below ,and there are two adults and a child in his household.Several of the own-price effects are large and statistically significant. The own-price compensated semi-elasticity for the transportation-communication budget share is 0.169, which implies that a transportation-communication price increasing of 1 percent would be associated with a budget share 0.169 percentage points higher when expenditure is raised to equate utility with which in the initial situation. In contrast, if the dwelling price declines by 1 percent, its budget share will be double than 1 percentage point lower when expenditure is raised to compensate for the loss in utility.

Several cross-price effects are also large and statistically significant, suggesting that substitution effects are important. For example, the dwelling budget share compensated transportation-communication cross-price semi-elasticity is -0.151, implying that an increase in the price of transportation-communication is associated with a significant decrease in the budget share for dwelling, even after expenditure is raised to hold utility constant.

Although some of the own-price elasticities and semi-elasticities in Table 5 are statistically significantly positive. all other own-log.priceSlutsky terms are negative except transportation-communication. This implies that concavity (negative semi-definiteness) is violated. Jorgenson and Fraumeni (1981),Diewert and Wales (1987) and Pollak and Wales (1992) proposed methods for imposing concavity conditions globally in the context of cost function estimation, Terrell (1996), Ryan and Wales (2000) and Ogawa (2011) devised methods for incorporating local concavity conditions into the cost function, maintaining flexibility of the functional forms. Therefore, we use the concavity function to check the local concavity of the cost function. The result shows the cost function is concave on more than 90 % of the observations.

To consider different observations migrate statue, we apply the Exact Affine Stone Index(EASI) implicit Marshallian demand system to analyse the urban subsample and migrate subsample. The estimation of urban subsample only can convergence without interaction terms such as py, zj, and pz', however estimation of migrate subsample can be convergent with interaction terms such as py, zj, and pz'. We use the Kernel density estimate to analysizing the two subsample. Figure2A presents the urban subsample is approximately normal distribution. Figure2B presents distribution of the migrate subsample is considerable degree of right skew and long-tail.Figure2C presents distribution of total sample is long-tail. Figure2D presents distribution of Lewbel and Pendakur (2009) sample is considerable degree of left skew. The results show Exact Affine Stone Index(EASI) implicit Marshallian demand system with interaction terms such as py, zj, and pz' only can estimating convergence with sample which is abnormal distribution, skew or long-tail.

5. Conclusion

In this study, we have applied the Exact Affine Stone Index(EASI) implicit Marshallian demand system , invented by Lewbel and Pendakur (2009) to analyse Chinese household consumer demand in urban area. To do so, we used Chinese Household Income Project Series (1995, 2002), Rural-Urban Migration in China (RUMiC,2008) and Annual of China Nation Bureau Statistic (1996, 2003, 2008). our result support Lewbel and Pendakur (2009) found the evidence to support a demand system rank is more than three to five. Moreover, our results present the relationship between the sample distribution and estimating convergence about EASI implicit Marshallian demand system with or without interaction terms such as py, zj, and pz'.

Our results have important implication to understand how heterogeneity demographic characteristics and price affect Chinese household consumer demand system in urban area. The results indicate that some demographic characteristics will affect household demand structure, including gender, the education level of householder, marital, the number of minor child, the number of adult, the migrate statue and the year dummy. Moreover, the household with a minor child increase the dwelling, education Crecreation and household furnishing ration of total expenditure significantly. The education level of household affects the household consumption structure. The year dummy increases the ratio of dwelling, household furnishing and education Crecreation, and decreases the ratios of food and clothing. This shows Chinese household demand structure and living standard are being improved from 1995 to 2007. As to price, the result indicates that cross-price effect suggests the substitution effect among seven consumption categories, for example the rising of transportation-communication price will decrease the ratio of dwelling in total expenditure.

The study has limitations, which need to borne in mind when interpreting the results, and which could be fruitfully addressed in future studies. Firstly, our price data is not accurate price for every consumption category in one area as Lewbel and Pendakur (2009). we use price index from Annual of China Nation Bureau Statistic to be instrument variable . Secondly, our sample is three-period mix cross-section data, however Lewbel and Pendakur (2009) use 12 periods data. Therefore, it limits contents and tools of our research. Future studies could use more Chinese Household Income Project Series.

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Table 1- Data Descriptives

Variable		Mean	Std Dev	Min	Max
Budget shares	Food	0.442	0.164	0	1.108
	Clothing	0.198	0.184	0	1.108
	transportation -communication	0.0548	0.0648	0	0.805
	dwelling	0.120	0.142	0	4.432
	education-recreation	0.0915	0.275	0	33.67
	household furnishing	0.0525	0.0803	0	4.032
	medical care	0.0497	0.0781	0	1.200
log price	Food	0.128	0.155	-0.0651	0.327
	Clothing	-0.0236	0.0406	-0.120	0.0392
	transportation -communication	-0.0365	0.0296	-0.0780	0.0129
	dwelling	0.138	0.116	-0.0222	0.343
	education-recreation	0.0277	0.0404	-0.0408	0.181
	household furnishing	0.0224	0.0631	-0.0471	0.182
	medical care	-0.0184	0.0881	-0.241	0.0554
Demographics	gender	0.486	0.500	0	1
	age	0.309	0.462	0	1
	edu	0.387	0.487	0	1
	marriage status	0.162	0.369	0	1
	minor child	0.385	0.487	0	1
	adult	0.481	0.586	0	4
	migrate	2.173	0.879	1	8
	year	1.278	0.729	0	2
Log-expenditure	x	9.608	0.724	4.094	13.52

Table 2 Wald-Test

Model	Test	parameters	df	Test Stat	p-value
Asymmetric with y^{-1}, y^6	inclusion	y^{-1}, y^6	Can't be convergent		
	inclusion	y^6	Can't be convergent		
Symmetric without y^{-1}, y^6	exclusion	B=0	20	590.44	0.0000
	exclusion	$A_l=0$ for all l	168	8458.42	0.0000
	exclusion	B=0, $A_l=0$ for all l	188	9361.51	0.0000
	exclusion	y^5	6	48.1	0.0000
	non-quadratic	Food	3	121.95	0.0000
	non-quadratic	Clothing	3	45.70	0.0000
	non-quadratic	transportation-communication	3	16.88	0.0007
	non-quadratic	dwelling	3	46.30	0.0000
	non-quadratic	education-recreation	3	10.76	0.0131
	non-quadratic	household furnishing	3	34.2	0.0000

Table 3 Wald-Test of main Demographic Varible

varible	**gender**	**age**	**edu**	**marital**	**child**	**adult**	**migrate**	**year**
test	$Z_1=0$;	$Z_2-=0$;	$Z_3=0$;	$Z_4=0$;	$Z_5=0$;	$Z_6=0$;	$Z_7=0$;	$Z_8=0$;
p-value	0.000	0.0336	0.000	0.002	0.000	0.000	0.000	0.000

Table 4 Demand System Parameter Estimates and t-Ratios

Variable	S1	S2	S3	S4	S5	S6
y	-7.306**	4.007	1.914*	6.038**	3.532	1.055
	(-2.76)	(1.92)	(2.04)	(2.78)	(0.73)	(0.76)
y^2	1.733**	-0.964	-0.509*	-1.604**	-0.772	-0.204
	(2.76)	(-1.95)	(-2.28)	(-3.11)	(-0.67)	(-0.62)
y^3	-0.197**	0.119*	0.0646*	0.207***	0.0795	0.0177
	(-2.70)	(2.07)	(2.49)	(3.45)	(0.59)	(0.46)
y^4	0.0106*	-0.00735*	-0.00397**	-0.0129***	-0.00378	-0.000586
	(2.53)	(-2.23)	(-2.68)	(-3.77)	(-0.49)	(-0.27)
y^5	-0.000219*	0.000178*	0.0000956**	0.000317***	0.0000646	0.00000295
	(-2.33)	(2.40)	(2.86)	(4.10)	(0.37)	(0.06)
gender	-0.141***	-0.143***	-0.00360	0.0166	-0.0149	0.0285
	(-4.26)	(-5.47)	(-0.31)	(0.61)	(-0.25)	(1.65)
age	0.0524	0.000296	0.00592	0.0350	-0.0558	0.0376*
	(1.44)	(0.01)	(0.46)	(1.17)	(-0.84)	(1.97)
edu	-0.167***	-0.000468	0.0589***	-0.0405	-0.0176	-0.0187
	(-4.32)	(-0.02)	(4.28)	(-1.28)	(-0.25)	(-0.92)
marital	-0.157**	0.173***	0.0474**	-0.0517	0.0668	-0.00216
	(-3.10)	(4.35)	(2.63)	(-1.25)	(0.73)	(-0.08)
child	-0.282***	-0.0391	-0.0657***	0.0813**	0.226***	0.0411*
	(-7.64)	(-1.33)	(-4.93)	(2.67)	(3.44)	(2.10)
adult	-0.172***	-0.0362	-0.00991	0.164***	0.0131	0.0238
	(-7.22)	(-1.92)	(-1.16)	(8.33)	(0.30)	(1.90)
migrate	0.00277	0.251***	0.0116	-0.387***	0.124	0.0733*
	(0.05)	(5.78)	(0.59)	(-8.55)	(1.24)	(2.54)
year	-1.552***	0.440**	-0.224	0.478***	0.0247	0.435***
	(-6.89)	(3.21)	(-1.90)	(4.41)	(0.12)	(3.81)
constant	13.03**	-7.210*	-2.574	-8.901*	-6.237	-2.208
	(2.99)	(-2.10)	(-1.66)	(-2.49)	(-0.78)	(-0.97)
R-sq	0.200	0.609	0.386	0.286	0.0411	0.097
chi2	**4903.2**	**27917.79**	**10779.85**	**7810.96**	**1076.88**	**2438.18**
P-value	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
obs	17880	17880	17880	17880	17880	17880

t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Omit regression coefficients of interaction terms such as py, zj, and pz'

Table 5 Compensated Price Effects, Evaluated for Reference Type with Median Expenditure at Base Prices

	own-price B element	own-log.priceSlutsky terms	own-price compensated Quant	Budget-share semi-elasticities					
				food	**cloth**	**T_C**	**dwelling**	**education-recreation**	**household furnishing**
food	-0.570***	-0.413	0.066	-0.166					
	(-5.05)			(0.080)					
cloth	0.0422	-0.621	-2.137	-0.011	-0.463				
	(0.61)			(0.056)	(0.081)				
transportation-	-0.0324	0.117	3.128	-0.091	0.004	0.169			
communication	(-0.71)			(0.033)	(0.034)	(0.052)			
dwelling	0.364***	-0.381	-2.184	0.184	0.416	-0.151	-0.275		
	(6.46)			(0.043)	(0.039)	(0.021)	(0.038)		
education-	-0.0795	-0.011	0.878	-0.014	0.103	-0.063	-0.165	0.072	
recreation	(-0.81)			(0.069)	(0.073)	(0.035)	(0.049)	(0.113)	
household	0.146**	-0.053	-0.003	0.123	-0.038	0.132	-0.030	-0.025	-0.003
furnishing	(2.90)			(0.038)	(0.039)	(0.027)	(0.026)	(0.045)	(0.040)

Note: Standard errors in parentheses.

FIGURE1 A.-NONPARAMETRIC ENGEL CURVE FOR FOOD SHARES

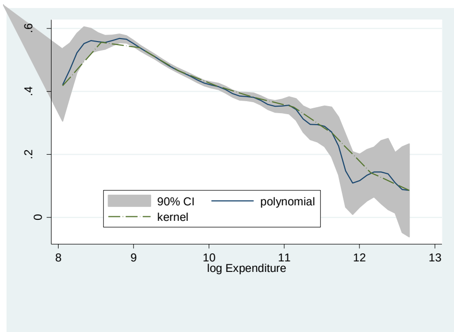

FIGURE1 B.-NONPARAMETRIC ENGEL CURVE FOR CLOTH SHARES

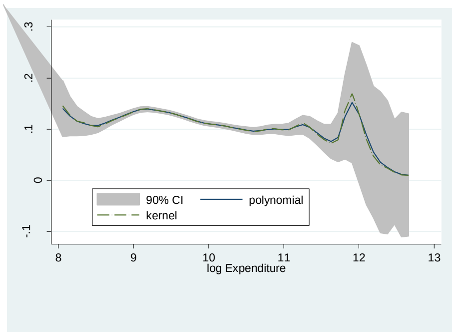

FIGURE1 C.-NONPARAMETRIC ENGEL CURVE FOR TRANSPORT AND COMMUNICATIONS SHARES

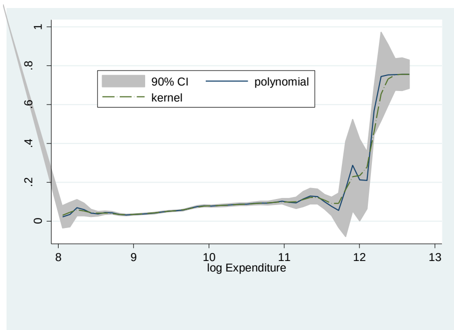

FIGURE1 D.-NONPARAMETRIC ENGEL CURVE FOR DWELLING SHARES

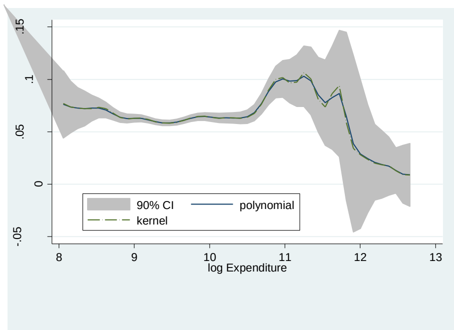

FIGURE1 E.-NONPARAMETRIC ENGEL CURVE FOR EDUCATION-RECREATION SHARES

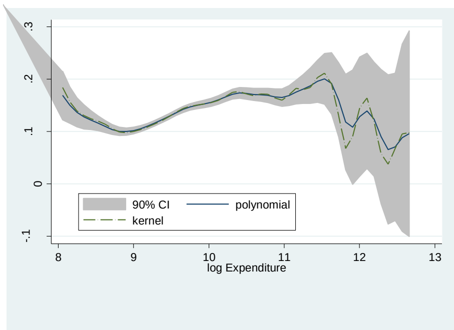

FIGURE1 F.-NONPARAMETRIC ENGEL CURVE FOR HOUSEHOLD FURNISHING

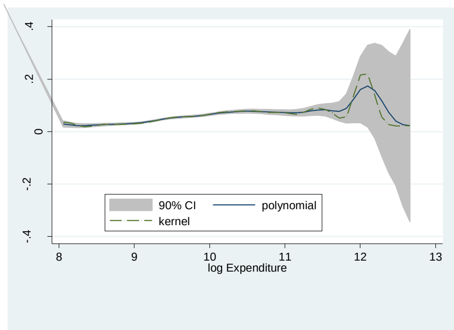

FIGURE1 E.-NONPARAMETRIC ENGEL CURVE FOR MEDICAL CARE

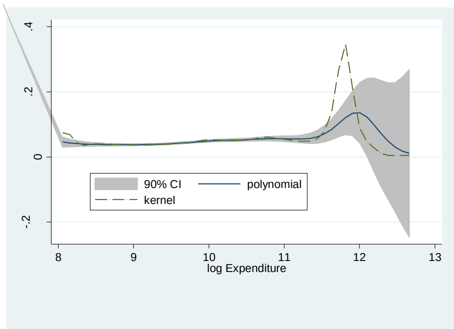

FIGURE2 A URBAN HOUSEHHOLD SUBSAMPLE

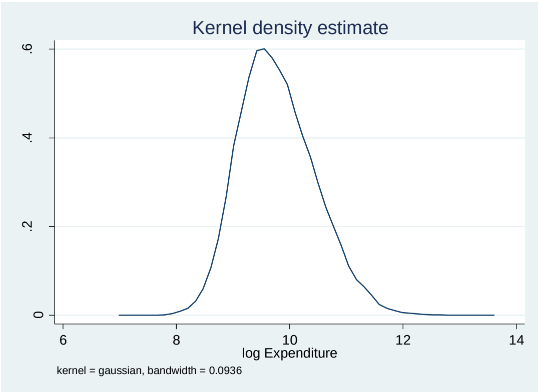

FIGURE2 B MIGRATE HOUSEHHOLD SUBSAMPLE

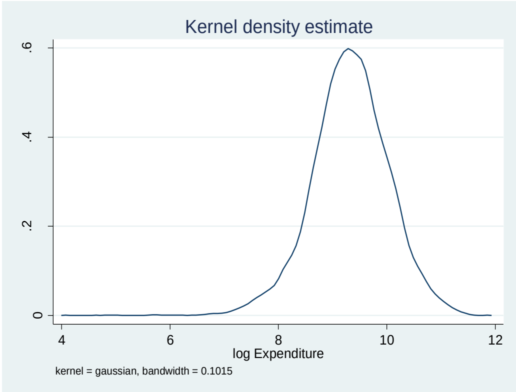

FIGURE2C TOTAL HOUSEHHOLD SUBSAMPLE

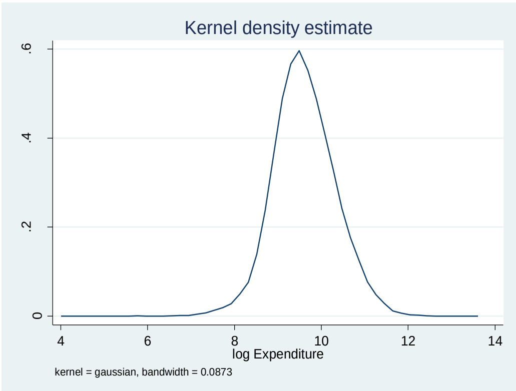

FIGURE2 D Pendakur and Lewbel(2009) SAMPLE